Chapter 5

Recommendations

In the Working Group's judgment, the primary solid waste issue facing Delaware is how the state can best preserve the valuable (and low cost) landfill capacity it currently has. Although the central and southern regions appear to have a substantial amount of capacity in their current landfills, Northern Delaware's situation is tight (see chapter 1). It is highly unlikely that this situation can be relieved by siting a new landfill in New Castle County. Siting a new landfill anywhere in Delaware, even if possible, would be very difficult and expensive. At best, capacity that is now costing $25 to $45 could well cost twice as much.

In addition, by seeking alternatives to landfilling, as directed by Governor Minner's charge, Delaware can conserve energy and material resources, create jobs in businesses recycling and reusing otherwise wasted resources, preserve valuable land resources that would be wasted on landfilling, and help avoid potential environmental problems (e.g., groundwater contamination, long-term stewardship of landfill). Although both problems are significant, the first is a direct problem to be avoided, while the second problem is one of missed opportunities. The challenge is to devise a strategy that will address both problems while maintaining a safe, low cost system for managing and disposing of the state's wastes.

The Working Group recommends a two-prong response to this challenge.

Source Reduction and Recycling

The first, and most important, prong is to divert as much material from being disposed of in the state's landfills as possible. This requires that Delaware adopt an aggressive and effective recycling (or materials recovery) program to divert materials, such as paper, metals, plastics, and glass, from the landfills. The Working Group makes no recommendations about how this should be done – the question of how is being addressed by other groups – but emphatically recommends that it be done, and as soon as possible.

The Working Group is unanimous in its recommendation that the state proceed with an effective source reduction and recycling program. This effort has the potential for maximum energy savings. The Cherry Island permit extension has a goal of 40% recycling by the end of 2007. Delaware's Recycling Public Advisory Committee study indicated at least 50% could be achieved. Planning needs to be initiated to set even higher goals that have been achieved by others. A zero waste approach can be helpful in this effort. One state's survey indicated 94% participate in the program and 93% believe in the effort. We should strive for such enthusiastic citizen participation. This will require providing appropriate incentives for households, commercial establishments, and government.

Another type of potentially valuable material that is needlessly using up landfill space is yard trimmings. These are estimated to account for 18 to 19 percent of the wastes currently being disposed of in Delaware's landfills. These materials could be diverted from the landfills, and processed to produce a useful product -- compost. Under the conditions of the permit recently issued by DNREC, yard trimmings will be prohibited from being disposed of in the Cherry Island landfill starting January 1, 2007. The Working Group recommends that this prohibition be extended to all of the state's landfills

The yard wastes committee apparently anticipated that the ban on yard trimmings would stimulate private and local government initiatives to provide disposal capacity for these wastes to the extent they were not retained as a mulching material by the generator, recognizing that the DSWA might have to provide backup capacity to handle these materials. The Working Group does not want to discourage such private initiatives, but believes that DSWA backup option should be implemented immediately. Thus the Working Group recommends that DSWA provide opportunities for citizens to dispose of yard wastes at each of its landfills and transfer stations, and that it institute processes for converting these wastes into useful compost or mulch.[1]

The state should also explore the feasibility of banning other types of wastes from the landfills to further divert potentially useable, recyclable, or hazardous materials from the incoming landfill waste stream. Electronic wastes, for instance, are becoming an increasingly serious problem but can be recycled or reused. DSWA has already instituted a special program for such wastes and the state should consider ways in which this program could be made even more effective.

In addition to implementing effective recycling programs to divert as much waste as possible from the state's landfills, Delaware should further evaluate and implement additional types of residential, commercial, and government source reduction/waste minimization programs. These programs have not yet had the attention they deserve. Reducing the amount of wastes generated with such programs would result in lower costs for everyone, and help preserve the state's disposal capacity.

If the state adopts this first prong and is able to institute effective recycling and yard waste diversion programs, the Working Group estimates that the amount of wastes requiring processing or landfilling could be reduced by some 250,000 tons per year.

New Processing Technologies

The second prong of the proposed response involves processing the wastes to: a) further reduce their volume, and b) convert them into useable products. The Working Group investigated seven processes that might be adopted to implement the second prong (see Chapter 4).

[1] These processes need not be in-vessel processes as the Working Group considered for disposing of MSW. They could as well be lower cost, traditional open windrow composting processes.

Of these, one, the bioreactor landfill, is an approach that DSWA is already using at the Central (Sandtown) and Southern (Jones Crossroads) landfills. This process accelerates the decomposition of waste in the landfills thereby increasing their effective capacity, while generating increased amounts of methane, which is a valuable energy source. The Working Group recommends that DSWA continue to pursue and enhance this approach, giving particular care to the installation and operation of effective gas collection systems, and supports its efforts to convert the landfill gas to electricity. A number of landfills across the country have already installed small electrical generating facilities operating on landfill gas.

These actions will both extend the life of the central and southern landfills and make use of the methane they produce. The bioreactor landfill, however, does not appear to be suitable or adequate for addressing Northern Delaware's problem. It is not clear that the Cherry Island landfill could be effectively operated as a bioreactor landfill, and there is insufficient space remaining for this approach to significantly increase its useful life. DSWA is already collecting and selling the gas being generated at Cherry Island landfill.

Of the six other processing options the Working Group investigated, two – autoclave with mechanical processing (the WastAway Process) and in-vessel composting – were not rated highly because the market for their products in Delaware is very uncertain. Products from both processes could be used to enhance soil quality, but, without substantial pre-processing, they would most likely contain too much contamination to allow other than very restricted use.[2] The products from both could be also used as a feedstock for a combustion or conversion process that results in the generation of electricity, but the Working Group was unconvinced that this would be more economical or generate fewer risks than using the waste materials themselves for these purposes.[3]

Two of the thermal processes – gasification and plasma arc conversion – were also rated relatively low, but for different reasons. Both technologies would substantially reduce the amount of waste that has to be disposed of (by over 90%) and both generate a useful synfuel product that can be used to generate electricity. However, the fact that no commercial sized facilities employing either technology have been built in the United States (and no commercial sized facilities using the plasma arc process with an MSW feedstock anywhere in the world) led the Working Group to conclude that their readiness and reliability has not been adequately demonstrated.

This left two technologies – anaerobic digestion and waste-to-energy. The former is a biological process that converts the organic components of the waste into a methane synfuel that can be used to power electrical generating facilities or as a feedstock for chemical manufacturing processes. The latter is a mass burn facility that directly generates electricity.

[2] If waste generators could be induced to remove potentially hazardous substances from their wastes (or if leachability tests on the existing waste stream showed that contamination was not a problem) and good markets were developed for the soil amendment products these technologies produce, these technologies have potential.
[3] As indicated in chapter 4, the WastAway company is exploring other possible uses for its product, and if these prove successful, the viability of this technology would improve.

Both result in a significant reduction in the amount of wastes that has to be disposed of, and both produce a useful product.

Compared to a waste-to-energy facility, the anaerobic digestion process has the following advantages:

- It does not generate hazardous air emissions which subsequently have to be captured by pollution control equipment,
- Because it does not generate hazardous pollutants, it is likely to be less controversial, and the construction of a facility would not require that current Delaware statutes be amended or repealed,
- Its product has alternative uses,
- It can also handle Northern Delaware's sewage sludge in the feed stream.

The waste-to-energy facility process, on the other hand, has the following advantages compared to the anaerobic digestion process:

- It's effectiveness in processing solid wastes and reliably generating electricity has been clearly demonstrated in the United States in facilities processing 1,000 tons per day or more,[4]
- It has among the most positive energy balances,
- It requires comparatively little acreage to process 1,000 tons per day,
- It can process whole tires in limited quantities.

One concern with the waste-to-energy process is that it generates dioxins and furans that are thought to be highly hazardous. The National Academy of Sciences is in the process of completing a comprehensive assessment of the toxicology of these compounds and the risks that they may create.[5] The Working Group's recommendation regarding this technology is contingent upon the results of this assessment. If the review finds that current EPA risk assessments understate the actual risks that these compounds present, many members of the Working Group would be opposed to proceeding with this technology. However, if the review finds that the current EPA risk assessments are about correct or overstate the actual risks, the majority of the Working Group members recommend that the state give this technology further consideration.

With this caveat, the Working Group recommends that Delaware focus its decision making on the two processes we have identified – anaerobic digestion and

[4] There are, at present, no anaerobic digestion facilities processing MSW in the United States, nor are there facilities anywhere in the world processing MSW at a rate of 1,000 tons per day.
[5] The Academy expects to release its findings at the end of May 2006.

waste-to-energy.[6] However, before making a final decision on the best technical approach, the state should address three issues.

1. The first is to determine whether anaerobic digestion will effectively process the MSW stream being produced in Northern Delaware. The application of anaerobic digestion processes to municipal wastes is a relatively recent development, and many of the existing facilities are processing only certain components of MSW. The Working Group recommends that the state quickly assess the suitability of this process for Northern Delaware's wastes by undertaking a pilot study processing Northern Delaware's MSW after removing the materials that would be expected to be diverted by the recycling program or removed as a result of the yard trimmings ban. The pilot study should also include sludge from the Wilmington waste water treatment plant.

2. The second is to assess the compatibility of the technologies with whatever aggressive recycling/source reduction programs Delaware implements. The state should delay building a MSW processing facility until it determines how successful the recycling, reuse, source reduction, and other programs are in diverting different types of materials away from the landfills, and the compatibility of the resulting modified waste stream with the alternative processing technologies being considered.

3. The third is to formulate an MSW management plan that carefully combines the various components of the waste management process together into an integrated solid waste management system that minimizes the amount of material that needs to be disposed of in landfills. This plan should carefully evaluate the potential complementarities and conflicts between the waste processing technologies being considered, and between these technologies and the recycling/source reduction programs being established in the state.

If the waste-to-energy facility is selected, the Working Group recommends that DNREC carefully monitor its emissions during periods of start-up, shut down, and process upsets to ensure that its pollution control equipment is providing continuous protection against public health risks.

While the Working Group recommends that the state proceed expeditiously with implementing its recommendations, it also recommends that Delaware improve and expand its solid waste planning efforts in the future. For instance, DSWA should keep careful track of developments with the processing technologies reviewed in this report to ensure that the final selection of processing technologies is based on the most up-to-date information relevant to Delaware's situation and needs.

DSWA should also update its state wide solid waste management plan on a periodic basis as required by its enabling legislation. This planning effort should be complemented

[6] It should be noted, however, that a minority of the Working Group members opposed any decision on a waste processing facility, at least until a minimum waste reduction, recycling and diversion goal is met.

by an aggressive public information and outreach program that keeps the public well informed about the progress being made in implementing the Working Group's recommendations and the other solid waste planning and management initiatives underway in the state.

The solid waste problem, of course will stay with the state regardless of what actions are taken now. For this reason, the Working Group further recommends that Delaware initiate a discussion with neighboring states (MD, PA, NJ) and communities about developing a regional waste management consortium and strategy to address an ever burdensome and growing waste management challenge in the future.[7] This is an important component to the long-term approach for successful solid waste management in Delaware. Although highly successful with managing its solid waste within its borders in the past, Delaware should not necessarily continue to operate in such isolation on this matter in the future, especially given the diminishing places in the state appropriate for waste management activities, as well as increasing out-of-state influences such as tourism. Regional cooperation will give Delaware more options to consider for waste management in the future.

Legislative Recommendations

Proceeding with an anaerobic digestion would require no legislative action. The existing rules and regulations governing the permitting of a facility such as this appear adequate to ensure that any public health, public nuisance, and environmental risks are properly considered. Worker safety issues are not directly addressed by these rules, but there appear to be no significant risks in this regard.

Proceeding with a waste-to-energy facility will require an amendment to SB 280. However, the Working Group believes that there is no reason to make such an amendment until the state completes its evaluation of the suitability of anaerobic digestion and prepares an integrated waste management plan as outlined above.[8]

Conclusions

The Working Group is unanimous in its recommendation that the state proceed with the first prong – implementing effective source reduction and recycling programs to divert wastes from the landfills – as quickly as possible. Any delay in implementing these programs is likely to have serious ramifications for the state in the future. Further, the Working Group also supports proceeding expeditiously with the second prong – addressing

[7] Such an agreement would probably require an amendment to the legislation establishing the DSWA allowing Delaware to accept wastes from out-of-state.

[8] In addition, before amending the legislation, it would probably be more efficient for the state to first select a proposed site for such a facility if it decides to proceed with this technology, and then propose an amendment to SB 280 that would exempt this specific site. Focusing on a specific site should result in the debate over the amendment being more focused and productive.

the three issues listed earlier, and building a processing facility to further reduce the amount of waste that has to be disposed of in the New Castle County landfill.

It is important to emphasize that the Working Group focused its attention on the technical factors related to the choice of a solid waste processing facility for Delaware. We recognize that there are many other considerations that have to be taken into account in making this decision. These include the question of where a facility should be sited, community acceptance, financing considerations, and ownership and operating responsibilities. The Working Group was established for the purpose of informing the decision making process, not being that decision making process. This also is the intent of our recommendations.